

E1 cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film-structure.

REMARKS

Claims 3-22 are pending. By this Amendment, claim 3 is amended. No new matter is introduced by this Amendment.

The attached Appendix includes marked-up copies of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

Reconsideration of the application in view of the foregoing Amendment and the following remarks is respectfully requested.

I. Claims 3-22 Define Patentable Subject Matter

A. The Office Action rejects claims 3-5 under 35 U.S.C. §103(a) in view of Saotomi. This rejection is respectfully traversed.

The Office Action asserts that Saotomi renders obvious the subject matter of claims 3-5. However, it is respectfully submitted that Saotomi does not teach or suggest forming on a substrate a thin film made of an amorphous material film exhibiting a viscous flow within a viscosity range of $10^8 - 10^{13}$ Pa·S when heated at a temperature within a supercooled liquid phase region, heating the film to a temperature within the supercooled liquid phase region, deforming the thin film to a given shape without the use of an external force and cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film structure, as claimed in claim 3.

As discussed in the Remarks filed January 28, 2002, Saotomi discloses a method for micro-forming a material using a V-grooved die. As shown on page 344, col. 1, micro-forming is carried out with a specially developed apparatus that enables a load control from

300 to 100 MPa in a compression punch stress and a punch speed from about .001 to .1 mm per second. Thus, as one can see from this disclosure, contrary to the claimed invention, the material is deformed using the weight of the press.

In Saotomi, the $\text{La}_{55}\text{Al}_{25}\text{Ni}_{25}$ alloy member is deformed under a supercooled liquid condition by utilizing a large external force of 10 MPa, which corresponds to about 10 kgf/cm². That is, in Saotomi, such a large external force is required to deform the $\text{La}_{55}\text{Al}_{25}\text{Ni}_{25}$ alloy member, which is quite different from the claimed invention which does not require an external force to deform the member. Therefore, the $\text{La}_{55}\text{Al}_{25}\text{Ni}_{25}$ alloy member cannot exhibit a viscosity flow within a viscosity of about $10^8 - 10^{13}$ Pa·S even though it is heated to a temperature within its supercooled liquid condition. In fact, the $\text{La}_{55}\text{Al}_{25}\text{Ni}_{25}$ alloy member is not exemplified in the specification of the claimed invention.

Additionally, it is submitted that Saotomi does not disclose that the thin film is heated to a temperature within a supercooled liquid phase region so that the thin film has a viscous flow between $10^8 - 10^{13}$ Pa·S. In fact, Saotomi never mentions or measures the actual viscous flow of the thin film material. Therefore, it is submitted that Saotomi does not teach or suggest the features of independent claim 3.

Accordingly, withdrawal of the rejection of claims 3-5 under 35 U.S.C. §103(a) in view of Saotomi is respectfully requested.

B. The Office Action rejects claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Saotomi in view of U.S. Patent 5,994,159 to Aksyuk. This rejection is respectfully traversed.

It is respectfully submitted that Aksyuk does not make up for the deficiencies discussed above with respect to Saotomi.

Aksyuk teaches a method of fabricating a thin film structure for a micro-mechanical device in which the thin film beam 8 is deformed by an external mechanical force. However,

Aksyuk does not teach a method wherein the method for producing a thin film structure comprises forming on a substrate a thin film made of an amorphous material exhibiting a viscous flow within a viscosity range of 10^8 - 10^{13} Pa·S when heated at a temperature within a supercooled liquid phase region, as claimed in independent claim 3.

Accordingly, due to their dependency upon claim 3, claims 6, 7 and 9-22 should also be considered allowable. Withdrawal of the rejection of claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Saotomi in view of Aksyuk is respectfully requested.

C. The Office Action rejects claim 8 under 35 U.S.C. §103(a) as being unpatentable over Saotomi and Aksyuk further in view of European patent EP0 762 167 to Tregilgas. This rejection is respectfully traversed.

Tregilgas teaches a method of producing a thin film structure by forming a beam 24 (see Fig. 3F) of an amorphous conductive material. See col. 1, lines 49-53. However, nowhere does Tregilgas discuss an amorphous material film exhibiting a viscous flow within a viscosity range of 10^8 - 10^{13} Pa·S. In fact, nowhere does Tregilgas discuss an amorphous material having a supercooled liquid phase region.

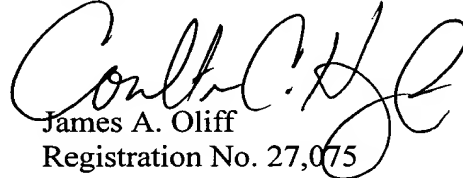
In view of the foregoing discussions, it is respectfully submitted that the combination of Saotomi, Aksyuk and Tregilgas does not teach, suggest or disclose the subject matter of independent claim 3. Therefore, due to its indirect dependency upon claim 3, claim 8 is also allowable. Accordingly, withdrawal of the rejection of claim 8 under 35 U.S.C. §103(a) in view of Saotomi, Aksyuk and Tregilgas is respectfully requested.

II. Conclusion

In view of the foregoing amendments and remarks, Applicants submit that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 3-22 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,



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Attachment:
Appendix

Date: April 12, 2002

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<p>DEPOSIT ACCOUNT USE AUTHORIZATION Please grant any extension necessary for entry; Charge any fee due to our Deposit Account No. 15-0461</p>
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APPENDIX

Changes to Claims:

The following is a marked-up version of the amended claim 3:

3. (~~Twice~~ Three Times Amended) A method for producing a thin film-structure comprising the steps of:

forming on a substrate a thin film made of an amorphous material ~~having a~~
film exhibiting a viscous flow within a range of 10^8 - 10^{13} Pa·S when heated at a temperature
within a supercooled liquid phase region;

heating the thin film to a temperature within the supercooled liquid phase
region; ~~so that the thin film has a viscous flow between 10^8 — 10^{13} Pa·S and thereby deforming~~
~~the thin film to a given shape without the use of an external force; and~~

deforming the thin film to a given shape without the use of an external force;
and

cooling the thin film to room temperature from the temperature within the
supercooled liquid phase region to stop deforming the thin film and thereby forming the thin
film-structure.